

REMARKS

In the Office Action, the Examiner rejected claims 1-27 under 112, and claims 1, 4-23 and 25-27 under 35 USC 103. These rejections are fully traversed below.

Claims 7, 12, 13, 23 and 24 have been amended. Claims 10 and 11 have been cancelled. Claims 28-30 have been added. Thus, Claims 1, 4-9 and 12-30 are pending in the application. Reconsideration of the application is respectfully requested based on the following remarks.

Response to Examiner Arguments

The Applicants respectfully disagree with the Examiner's statement that the specification gives conflicting and ambiguous indications of how the connector might be constructed. The specification provides several examples of how the connector might be constructed (see previous response). In some cases, the examples provide multiple ways of doing the same thing and thus they are not conflicting or ambiguous. It should be pointed out that applications are not limited to only one embodiment and multiple embodiments can be provided even if they venture in different directions.

Applicants believe the Examiner has misconstrued the specification (page 9, third paragraph of outstanding office action). One or more can be "one" or "more than one". Thus the Examiner's combining of two different sentences into one sentence is incorrect and deceiving. In one example, a single post indeed may be used. For example, a post integral with the outer conductive shell. In a case such as this, the contacts of the inner electrode may be coupled to the PCB through other means as for example directly through wires that connect to the contacts and the PCB. In another example, multiple posts may be used. For example, the outer conductive shell may include multiple posts (see Fig. 3A) and the inner electrode may include multiple posts (e.g., each set of contact pads (upper/lower) is connected to a separate terminal or post). Furthermore, the Applicants never argue that each set of contact pads is connected to a post which is integral with the outer conductive shell. Again, the Examiner is misconstruing the specification. As stated in the specification, the posts may be integral with the outer conductive shell and/or inner electrode. The specification goes on further to state that if the posts are integral with the inner electrode, the post may protrude through an opening in the outer conductive shell, the posts may be a portion of the insulating member, and the post may include

a wire embedded therein for connecting the contact pads to the PCB. The Applicants respectfully disagree with the Examiner's assertion that the disclosure contains ambiguous or conflicting or indefinite statements such that the Applicants can point to this or that sentence to find support of various positions. Again, applications are not limited to only one embodiment and multiple embodiments can be provided even if they venture in different directions.

With regard to the Examiner's comments (page 10, first full paragraph), the specification provides the following: Each set of contact pads (upper/lower) is connected to a separate wire, each of which is capable of being electrically connected to power cables, converters, or sources [paragraph 0037]; ...the contact pads and wires associated therewith are molded with the insulating member such that they are embedded in the insulating member [Paragraph 50]. Furthermore, as shown in Fig. 5A, the contact pads 226 are coupled to the PCB 308 via wires or other conductors (no reference number, shown by dark line) embedded in the insulating member 222A, and contact pads 230 are coupled to the plug 204 via wires or other conductors (no reference number, shown by dark line) embedded in the insulating member 222B.

With regard to the remaining arguments, the Applicants disagree with the Examiner's assertion that the Applicants used conflicting statements. As stated on page 16, lines 14-16 which states, "Each set of contact pads (upper/lower) is connected to separate terminal or post, each of which is capable of being electrically connected to a PCB." Furthermore, page 20, lines 4-12 states, "...the DC receptacle 202 generally includes one or more posts 270. The posts 270 may be integral with the outer conductive shell 210 and/or the inner electrode 212. If the later, the post(s) 270 may protrude through an opening in the outer conductive shell 210. In either case, the posts may serve as structural as well as a means for providing electrical connection to the internal components positioned in the housing as for example a printed circuit board (PCB). The posts of the inner electrode 212 may be a portion of the insulating member 222A. As such, the post may include a wire embedded therein for connecting the contacts pads to the PCB." Moreover, page 22 lines 3 and 4 states, "...the contact pads and wires associated therewith are molded with the insulating member such that they are embedded in the insulating member. As such, the post may include a wire embedded therein for connecting the contacts pads to the PCB." As can be seen from the foregoing, in one example, the contact pads are coupled to the PCB through a wire that is embedded in the insulating member and a post integral with the insulating member. That is, the wire starts at the contact pad, passes through the insulating member and post, and ends at the PCB.

The Applicants also disagree with the Examiner's assertion that the Applicants' examples do not clarify whether the contacts would be configured as separate contacts individually connected to separate power lines. As shown in Fig. 5A, in one example, each of the upper and lower contact pads are coupled to a set of wires that connect inside the insulating member and that exit the insulating member through a post. As stated above, page 16, lines 14-16 states, "Each set of contact pads (upper/lower) is connected to separate terminal or post, each of which is capable of being electrically connected to a PCB."

The Examiner should NOT have accepted the argument, "the concerns of the Examiner seem trivial as the structural details are hardly necessary and within the range of skills..." to mean structural details have not been supplied. As shown by the Applicants, the structural details can be found in the patent application outside of well-known practices such as soldering wires to a printed circuit board or contacts. Connections such as these are well within the scope of one skilled in the art.

With regard to teaching away, Davis does not have to positively recite why Eichorn would be undesirable in order to teach away. The reason that Davis includes such a polarity feature is to prevent multiple orientations. More than likely, the polarity feature is included to prevent people from plugging the connector the wrong way, a way that would not function properly or cause damage. In any event, preventing something that is claimed is the epitome of teaching away (see arguments below).

With regard to dimensions, it is emphasized that there are indeed reasons why there would be problems with large contact distances. As mentioned in the background of the present invention, traditional engineering approaches have used high friction over long distances in order to ensure proper electrical contact and securement between two connectors (see page 2 lines 2-11). The present invention goes in a different direction than these traditional approaches so as to make insertion and extraction easier. The present invention proposes using small axial contact distances to lessen the friction force and allow off angle manipulation of the connector (see Figs. 2A-2C). Engineers simply would not do this for the reason that the connectors would easily disengage as for example when they are bumped, and that they would not achieve the desired electrical contact thereby diminishing their functionality. Going in a different direction than the

prior art is simply not a matter of engineering design choice, but rather patentable advancement that is unrecognized by engineers following traditional guidelines.

Claim Rejections – 35 USC 112

Claims 1-24 have been rejected under 35 U.S.C 112, first paragraph, as failing to comply with the enablement requirement.

The Applicants respectfully disagree.

Concerning how the redundant contacts are configured, the Examiner is urged to first look at Figs 3 and 4, which show a plurality of contacts that are juxtaposed and positioned laterally of one another thereby forming a linear array of pins or pads. The contacts in the illustrated example are embodied as upper and lower planar pads. As stated in the specification on page 15, “the contacts are also laid out in a linear array. That is, the contacts 224 are spaced apart and positioned laterally relative to one another within substantially the same plane (e.g., juxtaposed). At least a center contact 225 is disposed along the centerline 206 or 208. At least a pair of redundant contacts are disposed an equal distance from the centerline 206 or 208 on opposing sides of the centerline 206 or 208.”

As shown in Fig. 5A, the upper and lower contact pads extend longitudinally into the receptacle. They are coupled together via a pair of wires, a first wire emanates from the upper electrode and a second wire emanates from the lower electrode. Furthermore, the pair of wires are coupled together in the insulating member, and a single coupled wire exits the receptacle where it is attached to the PCB. And as stated in the specification on page 16, “The upper contact pad is connected to the lower contact pad. This may be done proximally, distally or somewhere in between.”

Moreover, the inner electrode serves as a connection point for one of the critical power lines (e.g., return or driving). The inner electrode includes redundant contacts, each of which is configured to carry the desired power line. As stated on page 11, the redundant contacts may be dedicated to transmitting...the same driving current or the same returning current.” As stated on page 15, the redundant contacts are configured for transmitting the driving current. Because the

redundant contacts 227 are placed on both sides of the center contact, they are each capable of transmitting a driving current without having to account for the insertion position of the plug.”

Concerning how the contacts are secured to the housing (e.g., embedded, press fit or something else), the Examiner is directed to page 22, lines 2-6, which offers one example, “The insulating members are typically injection molded parts. Once molded, the contact pads can be positioned thereon. Alternatively, the contact pads and wires associated therewith are molded with the insulating member such that they are embedded in the insulating member. The insulating member is typically press fit into the outer conductive shell.” As can be seen this example, the contacts may be molded into or embedded in the insulating member thus securing the contacts to the insulating member, and further the insulating member may be press fit into the outer conductive shell thus securing the insulating member within the outer conductive shell.

Concerning how the contacts are attached at the receptacle 202 (e.g., wires, circuit board, etc.), the Examiner is directed to page 16, lines 14-16 which states, “Each set of contact pads (upper/lower) is connected to separate terminal or post, each of which is capable of being electrically connected to a PCB, “ and page 20, lines 4-12, which states, “...the DC receptacle 202 generally includes one or more posts 270. The posts 270 may be integral with the outer conductive shell 210 and/or the inner electrode 212. If the latter, the posts 270 may protrude through an opening in the outer conductive shell 210. In either case, the posts may serve as structural as well as a means for providing electrical connection to the internal components positioned in the housing as for example a printed circuit board (PCB). The posts of the inner electrode 212 may be a portion of the insulating member 222A. As such, the post may include a wire embedded therein for connecting the contacts pads to the PCB.” As can be seen from this example, the contact pads are connected to posts and the posts are connected to a PCB. The posts that carry current from the outer conductive shell to the PCB may be integral as for example tabs that are stamped. The posts that carry current from the inner electrode, and more particularly the contacts may be a portion of the insulating member with a wire embedded therein (e.g., molded). And again as stated on page 22, lines 3-4,”...the contact pads and wires associated therewith are molded with the insulating member...” This is further illustrated in Fig. 5A, which shows a pair of wires emanating from contact pads 226, passing through insulating member 222A, out of receptacle 202 to a printed circuit board 308.

With regard to how are the wires attached, even the undersigned, who is a mechanical engineer, understands several ways in which the wires may be attached to the contacts and the PCB. This is the most basic of concepts to any one skilled in the art. The simplest of examples is soldering, i.e., the first end of the wires is soldered to the contact, the second end of the wires is soldered to the PCB in the appropriate location on the PCB. With regard to the posts of the outer conductor, they may be soldered to the PCB thereby both electrically and mechanically coupling the posts to the PCB. Alternatively, they can be pressed or snapped into place.

Claim Rejections – 35 USC 103

Defective Prima Facie Obviousness Rejections

A prima facie case of obviousness has not been properly made. *Davis* (the primary reference) clearly teaches away from the present invention, and as held in *U.S. Adams*, 383 U.S. 39, 1248 USPQ 479 (1966), “teaching away” from the claimed invention by the prior art or by experts in the field at the time of the invention is one important indicium of nonobviousness. As mentioned before, *Davis* teaches a connector that only mates one way. That is, it cannot rotate 0/180 as required by the claims. The connector is purposefully designed for single polarity. As shown in the Figures, *Davis* includes a chamfer to ensure only one mating orientation. Furthermore, *Davis* states, “The mating end 12 has a profile including chamfers 35. Fig. 2 that intersect the wall 14, making the wall 14 less wide than wider wall 15 thereby providing the connector 1 with polarity for orienting the mating end 12 (Col. 4, lines 18-21).” The Examiner appears to agree with the Applicant when he states, “...*Davis* does not show the connector as being reversible (due to the polarizing feature of the cut corners as seen clearly in Fig. 2).”

It should be emphasized that the chamfer or polarizing feature is there for a reason. Although not positively recited in *Davis*, it is most likely there to prevent a person from mating the connector upside down, which would cause the connector to fail or not function properly. For example, the connector includes three pairs of contacts, each of which are connected to a different pair of twisted pair wires. If rotated 180 degrees, the signals of the side contacts would not be transmitted to their proper destination since they would be contacting the contact on the other side of the center contact. As a result, the connection would fail or not function properly. As should be appreciated, this clearly teaches against one of the main embodiments of the present invention, which is to allow multiple mating orientations, and more particularly 0/180

degree orientations. Single orientations is one of the problems the present invention is trying to solve. One skilled in the art would simply not be motivated to rely on *Davis* since *Davis* teaches against multiple orientations.

Not only that, it should be emphasized that references are not properly combinable or modifiable if their intended function is destroyed. The CCPA and the Federal Circuit have consistently held that when a 103 rejection is based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in the reference, such a proposed modification is not proper and the prima facie case of obviousness cannot be properly made. An example of such an evaluation is *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Accordingly, the rejection is improper and should be withdrawn.

Arai suffers the same drawbacks as *Davis*. *Arai* is similar to *Davis* in that *Arai* requires keys and keyways for single position mating (see Figs. 3 and 4). *Arai* states, "...It is another object of this invention to provide a connector socket, a connector plug and a connector assembly which provides for discriminating many type of connectors to prevent connection between wrong type of connectors (Col. 2, lines 37-40)." *Arai* also states, "...and key boss is disposed in the cylindrical groove in opposing relation with the at least one plate surface of the support so as to prevent wrong connection between different type of connector socket and connector plug (Col. Lines 63-67)." In fact, *Arai* deems this feature so important that he even claims it (see claim 1). One skilled in the art would simply not be motivated to rely on *Arai* since *Arai* teaches against multiple orientations. Accordingly, the rejections are improper and should be withdrawn.

Shi suffers the same drawbacks as *Davis* and *Arai*. As is well known, USB connectors have single polarity, i.e., they can only be connected one way. Accordingly, the rejections are improper and should be withdrawn.

Not only do *Davis* and *Arai* and *Shi* teach away from the claimed invention but they further provide no motivation to combine with *Eichorn* outside of all the references being associated with being connectors. This however is not enough. If such a rote invocation could suffice to supply motivation to combine, the more sophisticated scientific fields would rarely if ever experience a technical advance. Simply put, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests

the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

Claims 1, 4-13, 21, 22, 23 have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Davis* (5,785,557) in view of *Eichorn et al* (6,530,793).

Claim 1

In contrast to *Davis* and *Eichorn*, claim 1 specifically requires, "...the inner electrode having redundant power contacts that are electrically isolated within the same plane, the redundant power contacts being laterally spaced apart equally to a central axis..." *Davis* and *Eichorn* further do not teach or suggest redundant power contacts such as these that are capable of 0/180 degree insertion. Accordingly, the rejection is unsupported by the art and should be withdrawn.

Also in contrast to *Davis* and *Eichorn*, claim 1 specifically requires, "...the outer shell and inner electrode of the DC connector having an axial contact distance with the second outer shell and second inner electrode of the second DC connector of less than 5 mm when fully mated so as to minimize the mating force between the DC connectors, and to allow angled insertion and extraction away from the mating axis during the 0/180 connection with the second DC connector." Both references are completely silent to reduced axial contact distances. Furthermore, *Davis* appears to teach lengthening the connector which is opposite of shortening. See Fig. 3 and Col. 6, lines 28-39. Accordingly, the rejection is unsupported by the art and should be withdrawn.

Claim 7

In contrast to all the references, claim 7 (and its dependents) specifically requires, "...the juxtaposed contacts including a center contact and first and second lateral redundant contacts that are equally spaced from the center contact and positioned in their entirety on opposing sides of the center contact..." and further, "...wherein the center contact of the DC plug mates with the center contact of the DC receptacle in both the 0 and 180 degree orientations, ... the first lateral redundant contact of the inner electrode of the DC plug mates with the first lateral redundant contact of the inner electrode of the DC receptacle and the second lateral redundant contact of

the inner electrode of the DC plug mates with the second lateral redundant contact of the inner electrode of the DC receptacle in the 0 degree orientation, and...the first lateral redundant contact of the inner electrode of the DC plug mates with the second lateral redundant contact of the inner electrode of the DC receptacle and the second lateral redundant contact of the inner electrode of the DC plug mates with the first lateral redundant contact of the inner electrode of the DC receptacle in the 180 degree orientation. No such feature is taught in the cited art whether solely or in a combination. Accordingly, the rejection is unsupported by the art and should be withdrawn.

Claim 21

In contrast to *Davis* and *Eichorn*, claim 1 specifically requires, "...the insertion and receiving elements having a small axial contact distance between about 3 and about 4 mm in order to minimize the insertion extraction force found between the insertion and receiving elements." Both references are completely silent to reduced axial contact distances. Accordingly, the rejection is unsupported by the art and should be withdrawn.

In contrast to all the references, claim 21 (and its dependents) specifically requires, "...the insertion element being configured for only 0/180 degree insertion into the receiving element while providing the same functionality from both positions... at least a portion of the corresponding contacts being power contacts for allowing DC power transmission to occur between the DC receptacle and DC plug." Accordingly, the rejection is unsupported by the art and should be withdrawn.

Claims 14 and 15 have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Davis* and *Eichorn* as in claim 7 in view of *Arai* (6,482,045).

Arai does not overcome the deficiencies of *Davis* and *Eichorn*. None of the references teach or suggest the limitations required by independent claim 7. Accordingly, the rejection is unsupported by the art and should be withdrawn.

Claims 16-20 and 27 have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Davis*, *Eichorn* and *Arai* as discussed regarding claims 1-15.

In contrast to all the references, claim 16 (and its dependents) specifically requires, "...a holding detent mechanism...and...one or more contact flexures for ensuring electrical contact between the DC receptacle and the DC plug." None of the references teach or suggest a combination of these elements. The combination provides proper electrical contact, proper holding power during use and minimized insertion and extraction forces. Accordingly, the rejection is unsupported by the art and should be withdrawn.

Claims 25 and 26 have been rejected under 35 U.S.C. 103(a) as being unpatentable over *Davis, Eichorn, Arai and Shi* (2001/0053630).

Shi does not overcome the deficiencies of *Davis* and *Eichorn* and *Arai*. None of the references teach or suggest the limitations required by independent claims 7 and 16. Accordingly, the rejection is unsupported by the art and should be withdrawn.

With regards to all of the above, although the rejections to the dependent claims should be withdrawn for at least the reasons mentioned above, it should be noted that they offer additional language that is unsupported by the art.

SUMMARY

Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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